BenchMark Wireline Products
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AM5K COMBINED DEPTH/TENSION MEASUREMENT DEVICE

ATEX ZONE 2 CE

WEATHERFORD WIRELINE
LMS CSD KA

Open Hole configurations
Dual Encoders
Mag Mark Detector

AM5KA507 – Original encoder wiring
AM5KA527 – New encoder wiring

Case Hole configuration
AM5KA524 – No Mag Mark Detector

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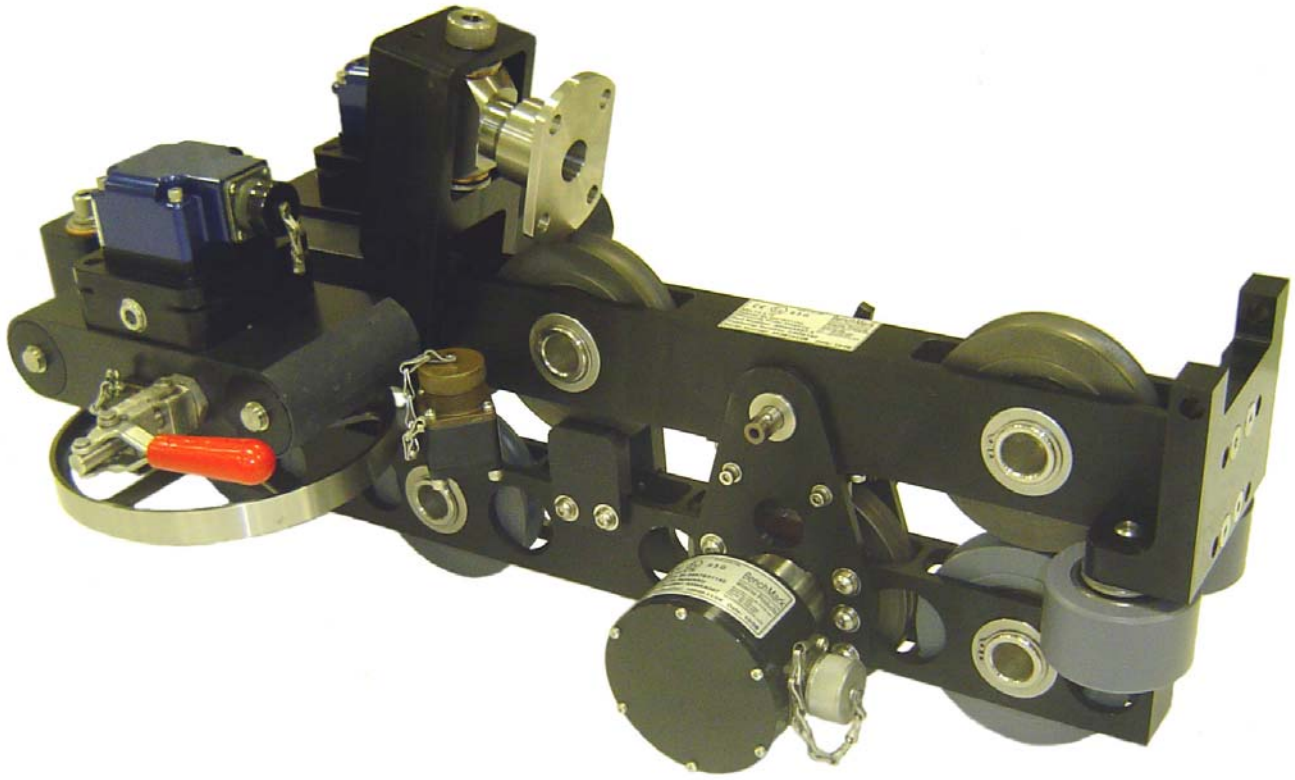
1.0 GENERAL

The Kerr AM5K Wireline Measuring Device is a compact and lightweight device for measuring both wireline depth and tension. The device is designed to be mounted to the spooling arm of a wireline unit. It is unique to other measuring devices in that it measures both depth and tension on wireline cables from .190" to .494". This device will work on both open and cased hole wireline units which allows standardization on a measuring head for all types of operations.

The AM5KA507 Measuring head comes with encoders wired in the original wiring scheme. The encoders have a black cover. The encoder cables used with these encoders have a black jacket.

The AM5KA527 Measuring head comes with encoders wired in the new wiring scheme. The encoders have a blue cover. The encoder cables used with these encoders have a blue jacket.



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FEATURES AND BENEFITS:

- **Straight-line measurement (cable sizes can be changed without affecting measurement)**
- **Dual Tangential Measuring Wheels made from specially hardened steel**
- **Accepts cable sizes from .190” to .494” diameter (4.8 mm to 12.55 mm)**
- **Lightweight design with integral tension makes the device ideal for high angle rigups**
- **Device opens up to provide easy cable installation and removal, by removing a single pin**
- **Includes both horizontal and vertical guide rollers to minimize measuring wheel loading**
- **Rollers are oversized to increase reliability and reduce maintenance**
- **Guide rollers are made from composite material to reduce weight and cable wear**
- **Rear or Center spooling arm mount to minimize head “jerking”**
- **Tension Load Axle and amplifier can be configured for different outputs.**
- **Digital Magnetic Mark Detector**
- **Accepts single or dual encoders**
- **Supports fully independent backup depth measuring system using a magnetic pickup**
- **Backup depth system reduces drag on measuring wheel by eliminating mechanical drive cable**
- **Encoder, Mark Detector, and Tension amplifier certified for Zone II area use**
- **Anodized aluminum frame. All steel parts are plated or SST**

2.0 SYSTEM DESCRIPTION

DEPTH MEASUREMENT:

The AM5K Measuring Head uses dual spring-loaded measuring wheels to measure the amount of wireline moving to and from the borehole. The measuring wheels are coupled to one or two optical encoders that transmit electrical signals via a cable to the hoistman's panel and/or logging computer. An independently powered magnetic encoder is used for back up depth indication.

The hardened measuring wheels are 2.0000 ft. (.609600 m) in circumference. Springs are used to hold the measuring wheels in contact with the wireline. The springs are sized to provide the appropriate friction between the wheels and wireline. The frame members are anodized 6061-T6 aluminum.

Under ideal conditions, without magnetic marks, the measuring heads have an accuracy of +/- 3 m in 3000 m (10 ft in 10,000 ft.). With magnetic marks and accurate line stretch calculations, an accuracy of .3 m in 3000 m (1 ft in 10,000 ft) can be achieved. The Kerr Hoistman's panel is required to fully utilize the Kerr mark detection and stretch correction algorithms.

TENSION MEASUREMENT:

Power Requirements:	12 vdc excitation	
Interface:	Kerr proprietary circuit board which buffers the load pin signals and provides a 3mv/v output	
Temperature stability:	<= .015% full scale / deg F on zero	
	<= .02% full scale / deg F on output	
Accuracy:	Within 150 lbs or 3% of actual, whichever is greater	
Maximum load (tested):	16,000 lbs	7,258 kg
(theoretical):	20,000 lbs	9,072 kg

GENERAL SPECIFICATIONS:

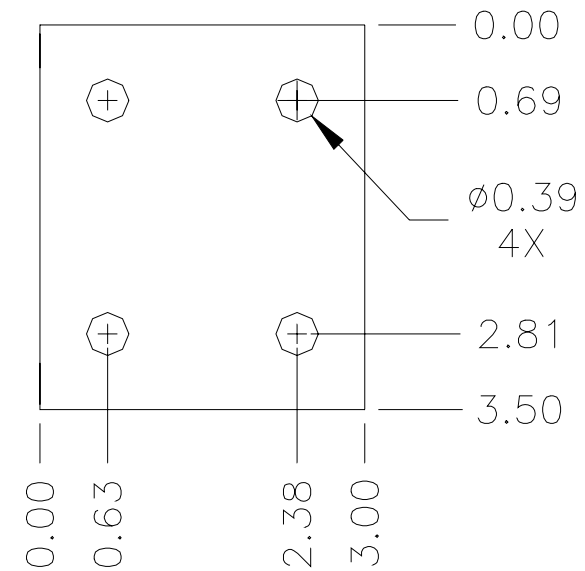
WEIGHT:	58 lbs	26.3 kg
LENGTH:	26.5”	673 mm
HEIGHT:	10.8”	274 mm
WIDTH:	15.3”	389 mm
MAXIMUM TENSION:	20,000 lbs	9072 kg
MEASURING WHEEL SIZE:	24.000”	609.60 mm
CABLE SIZES:	.190” to .494”	4.8 mm to 12.55mm

CABLE BEND OVER TENSION WHEEL: 2.5 – 7.5 degrees (depends on cable)
Minimal or no affects on magnetic marks

3.0 OPERATION

3.1 SPOOLING ARM INSTALLATION – OVERHEAD SPOOLING ARM

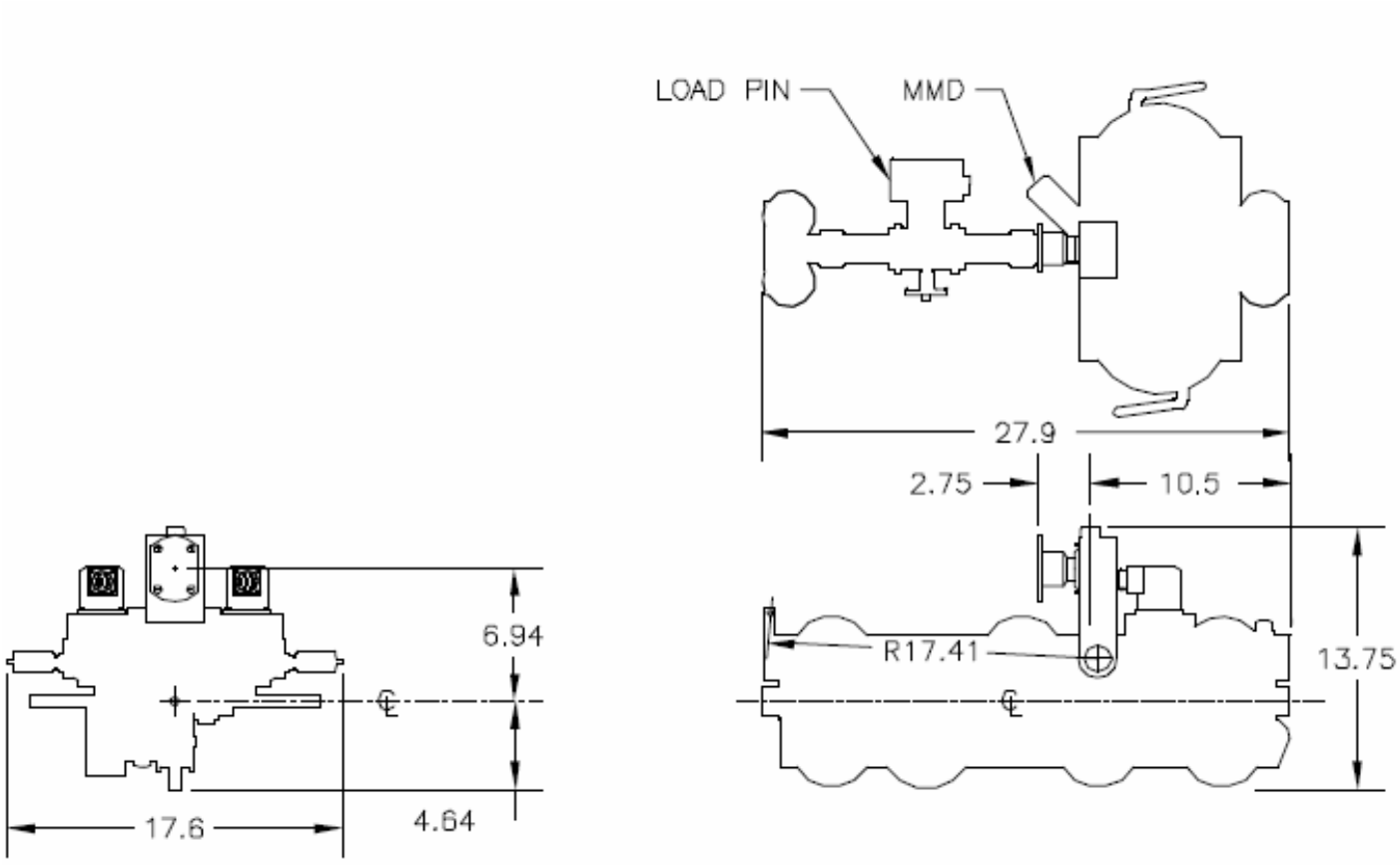
Install the measuring head on to the spooling arm by using the top adapter mount assembly to mount to an overhead spooling arm. The mount is designed to mount with a standard U-joint yoke.



MOUNTING PLATE DETAIL

MOUNTING YOKE

Make sure that the head can freely sit on the wireline. If the mounting arrangement will not let the head travel up and down freely and if the cable puts a upward or downward force on the measuring head, this force will cause an offset to the tension measurement which will result in an incorrect tension reading.

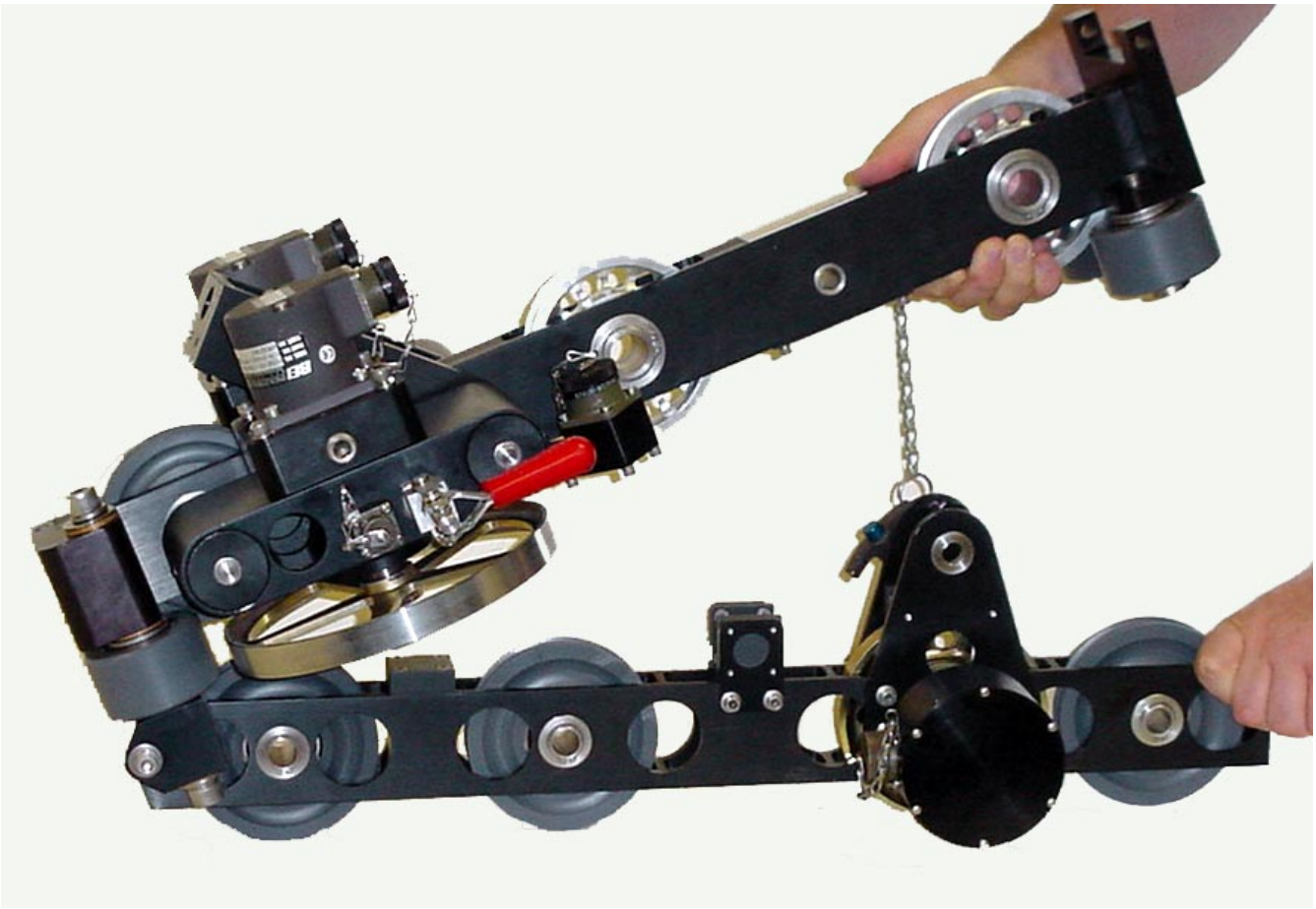


3.2 CABLE INSTALLATION

To install cable, first open the wheels by shifting the red release handles.

Next, remove the push pin, and hinge the head open.

Lifting up on the wireline cable makes it easier to remove the push pin.



The cable can now be inserted or removed.

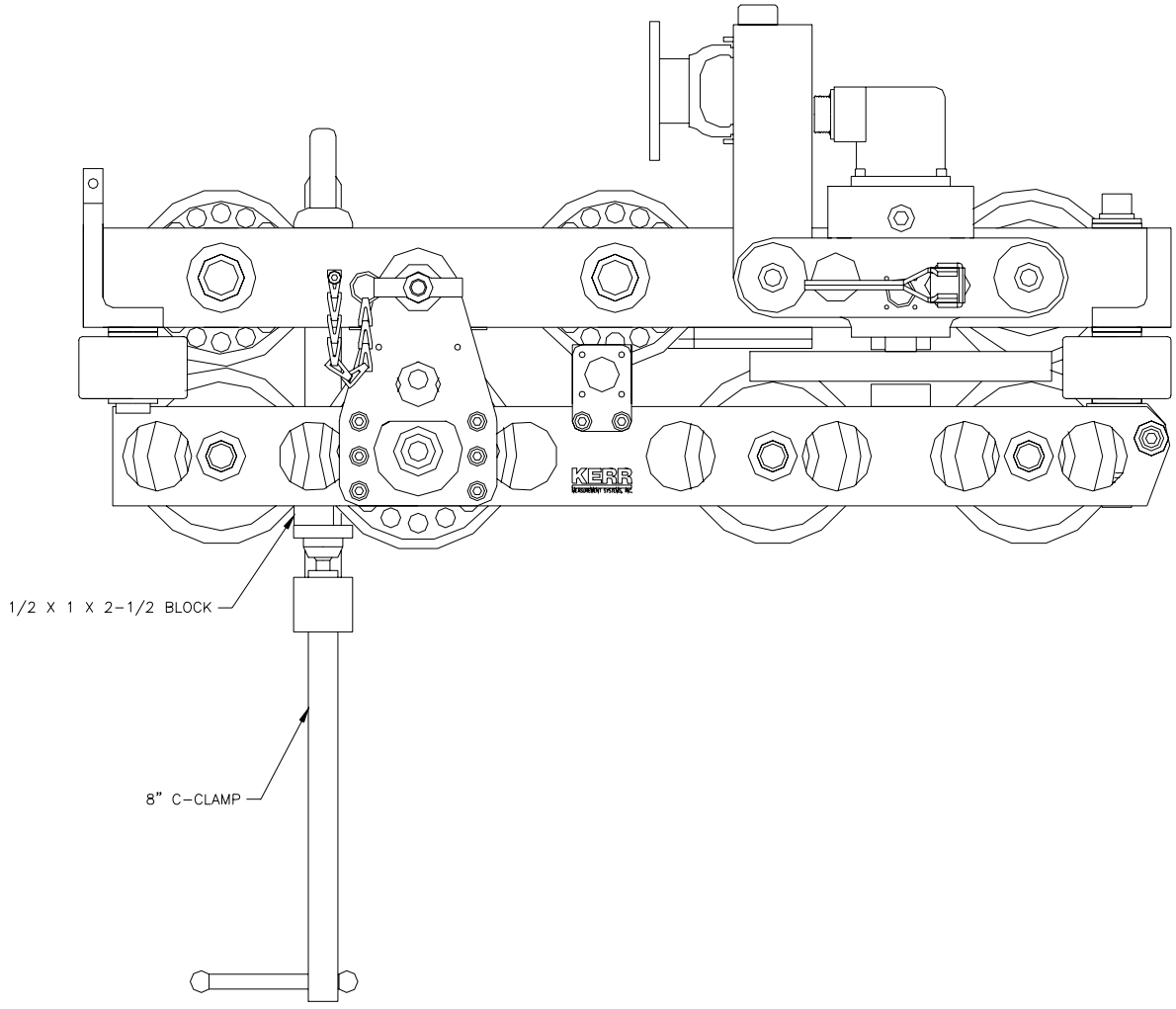
Close the red release handles to tighten the wheels against the wireline.

Swing the head closed and reinsert the pin.

3.3 CABLE REMOVAL UNDER LOAD

3.4.1 If under load, the load will need to be removed from the device prior to removing the retaining pin. A “C-clamp" or a nylon "ratchet strap" can be used to remove the load.

3.4.2 Install a C-Clamp across the top and bottom frames as shown in the drawing below. The ratchet strap can be installed in a similar way.



3.3.3 Tighten the C Clamp until the load is removed from the retaining pin. Remove the retaining pin then loosen and remove the C Clamp.

3.4 CHANGING CONFIGURATION BETWEEN OPEN HOLE AND CASED HOLE

A measuring head configured for open hole will typically contain a magnetic mark detector and a 2nd encoder. Cased hole operations rarely require a magnetic mark detector and typically use only one encoder.

If the head is configured for open hole, no changes are required to run it on a cased hole unit. You may elect to remove the magnetic mark detector if you have no plans to use the head on an open hole unit any time in the near future.

The cased hole head can be configured with a different wear plate. The cased hole wear plate is thicker and stepped on one end to the keep the line from riding near the top of the wheels. This can occur when going in the hole with a small cable (7/32") with a very light load. The open hole wear plate is flat. Both plates are made from hardened tool steel. The wear plate is mounted on the upper frame above the measure wheels.

Part number for the open hole wear plate is: AM5KM034
Part number for the cased hole wear plate is: AM5KM074

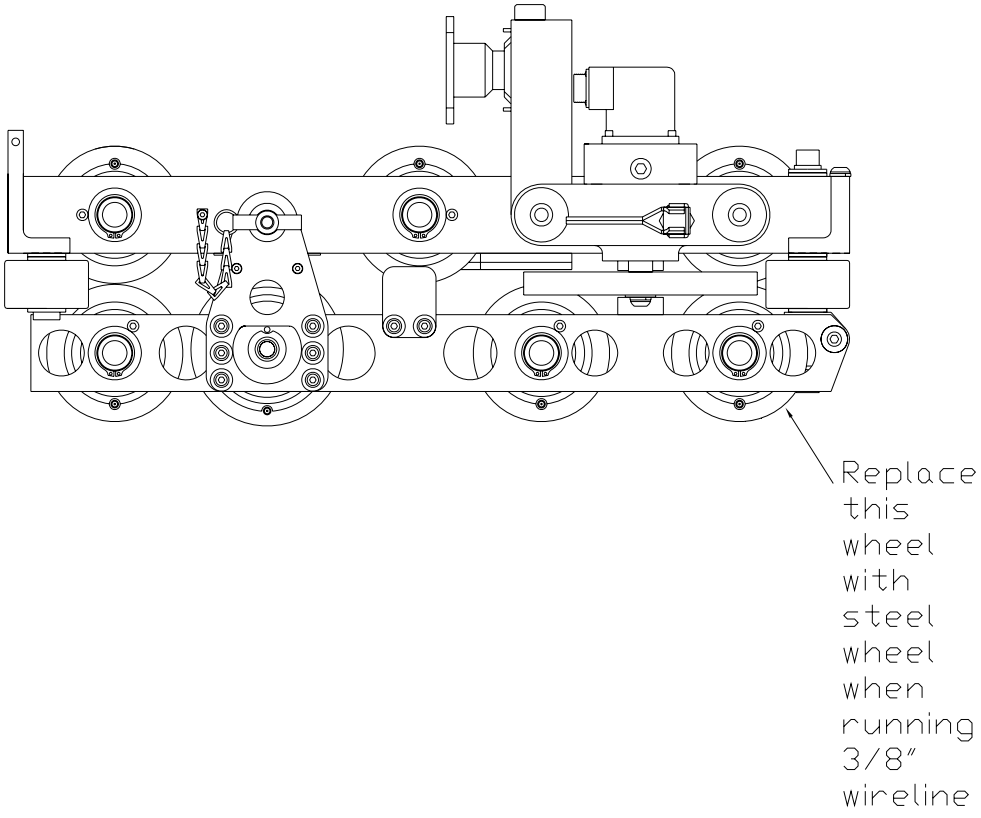
3.4.1 To remove the magnetic mark detector, refer to item 12 of drawing 6.2. Remove the four screws holding the detector in place then remove the detector. To install a magnetic mark detector, reverse this procedure.

3.4.2 To remove an encoder, remove the four screws securing the encoder adapter to the head. Remove the encoder and adapter. Remove the coupling from the measuring wheel shaft.

3.5 3/8” CABLE GUIDE WHEEL

A steel guide wheel is available for use with 3/8” wireline. This wheel has a shallower groove that forces the wireline to ride nearer the mark detector. This improves mark detection with 3/8” wirelines.

The part number for this wheel is AM5KA183. It is a direct replacement for the composite wheel normally mounted in this location.



3.6 INSTALLING THE DEEP GROOVED TENSION WHEEL

3.6.1 A Deep Groove High Load tension wheel is available for use when line tension greater than 12,000 lbs is commonly encountered. This wheel has a deeper groove to better support the wireline at high tensions. The deep groove also reduces the radius of the wheel which lowers the bend angle of the wireline.

This wheel is only for use with .472 Slammer or .494 Super Slammer cables and cannot be used with smaller cable sizes. For cables larger than .472, the severe load tension wheel should be used.

The normal wheel can be used at high loads for short pull durations but should not be used when loads exceed 12,000 lbs for an extended period of time.

3.6.2 To install the High Load tension wheel, replace the standard shallow grooved tension wheel with the deep grooved tension wheel. The load pin does not need to be changed. The High Load tension wheel can be ordered from Kerr Measurement Systems Inc. by part number AM5KA073. This kit includes the Tension Wheel, and bearing. It can easily be installed in the field.

Ensure that the slot in the bushing of the tension wheel is aligned with the roll pin on the side of the frame. The roll pin is only installed on one side of the frame and it needs to be inserted in the slot.

DEEP GROOVED HIGH TENSION WHEEL

STANDARD SHALLOW GROOVED TENSION WHEEL

3.7 SYSTEM OPERATION

3.7.1 Determine cable size to be used – .484" to .190". Since the wireline cable actually bends around the tension wheel, the bend radius of the wireline cable will affect the tension measurement.

3.7.2 Enter tension calibrate factor. These corrections are automatically made in the Kerr hoistman's panel by selecting the proper cable size using the menu. If a different panel is used, enter the tension factor at this time.

3.7.3 Install line in measuring head. (refer to section 3.2)

3.7.4 Make sure line is laying slack and head is free to move. Press the Ten Zero Cal button and tension value should read 0.

3.7.5 Press the Zero Depth button to set the depth to zero when the tool is hanging at the zero point.

3.7.6 Simultaneously press the enable and zero button on the backup display panel at this time to set its zero.

3.7.7 At this point, the system is ready to log. Watch for visual indications of problems such as excessive vibration, wheel or roller slippage or lockups that signify bearing or shaft failures, or cable tracking problems.

4.0 MAINTENANCE AND REPAIR

4.1 PRE-JOB CHECK

Each time the system is used perform the following steps:

Verify that the AM5K is properly and securely attached to the spooling arm. Several different mounting kits are available for different types of spooling arms.

Verify that the depth measuring wheels are clean and that no groove has been worn into the measuring wheel surface. Check the measuring and guide wheels for looseness, play, out-of-roundness, worn or rough sounding bearings, or other mechanical conditions that could affect measurement accuracy. Ensure that the wheel bearings inner race is not spinning on the shaft and that the shaft is not spinning in the bushings.

Verify that all fasteners are tight and that the ball lock pushpin is secure. Verify that the encoder, electronic load pin, and backup counter cable are installed and properly routed. Verify that the depth system is working by turning the wheel and observing the hoistman's panel and backup display unit to indicate cable movement. The hoistman's panel and backup display should measure 2' for each rotation of the wheel. If more than one encoder is installed check both encoders by turning each wheel and verifying that the hoistman's panel will read 2' for each rotation of either wheel.

4.2 POST-JOB MAINTENANCE

At the completion of each job, thoroughly clean and dry the device as soon as possible. This avoids problems caused from borehole residues transferred from the wireline onto the measuring device. Borehole residues should be washed from the device with a cleaning solvent such as Varsol or an equivalent type. Rinse the device with water, dry, and wipe down with an oily rag.

Do not pressure wash

4.3 MONTHLY MAINTENANCE

Visually inspect the interiors of the electrical connectors for the encoders and electronic load axle for dirt and evidence of insulation breakdown. Clean or replace as necessary. Install dust caps on the connectors if the cables are removed.

Manually rotate each wheel by hand to verify its condition. Inspect the depth measuring wheels for signs of abnormal wear, diameter changes, or shaft/bearing play that can affect measurement accuracy. The wheel should be replaced if it is grooved more than .005". The wheel should be 7.639 / 7.640" (194 mm) in diameter with a 24" circumference (609.6 mm).

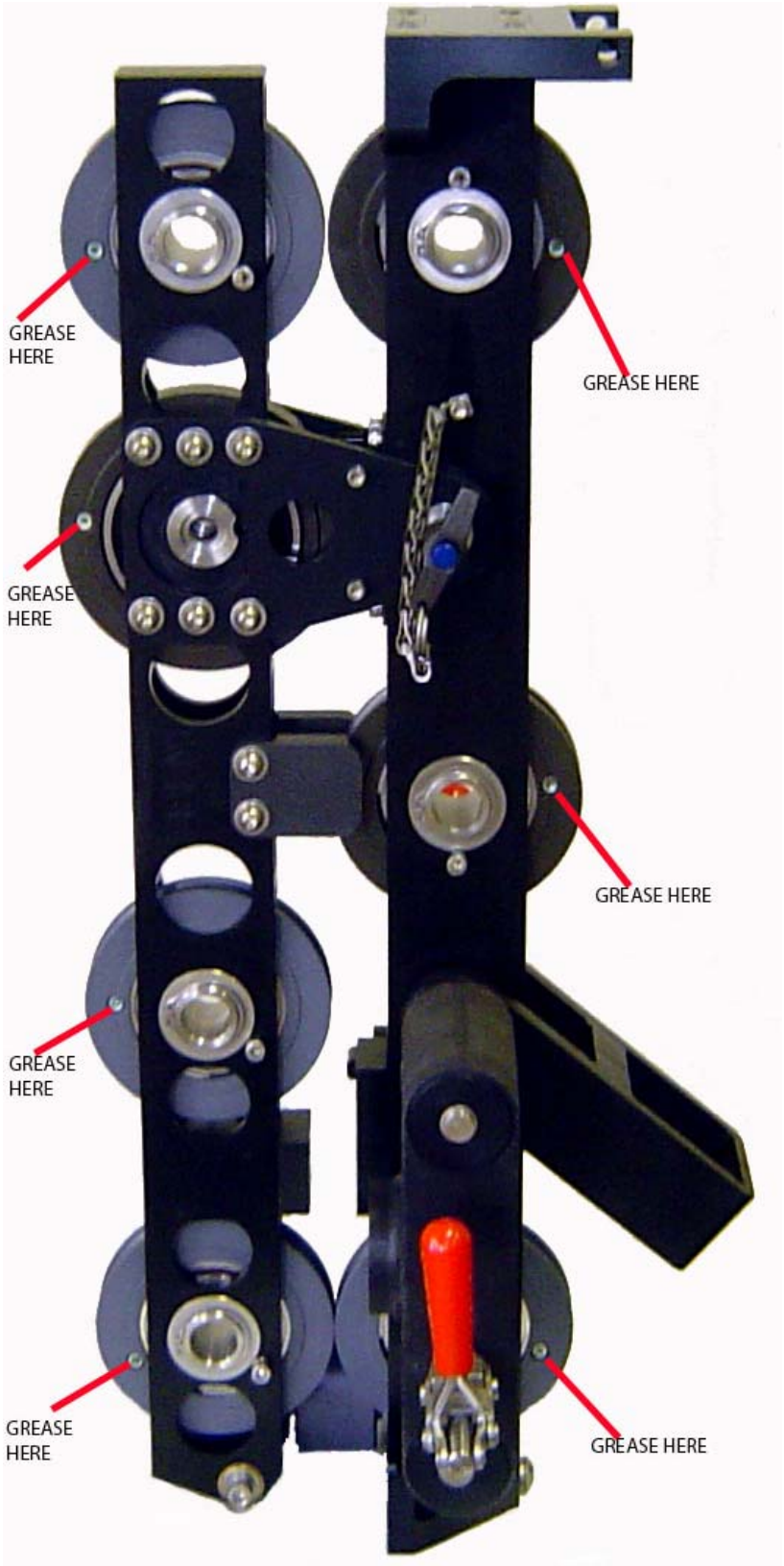
Inspect the tension wheel for signs of abnormal wear, diameter changes, or shaft and bearing play that could affect tension measurement accuracy. The shallow groove tension wheel (item 33 in section 6.1 of this manual) should be 5" in diameter at the bottom of the groove. It should be replaced if it is worn more than .010".

The deep grooved tension wheel (item 33 in section 6.1 of this manual) should be 4.375" in diameter at the bottom of groove. It should be replaced if it is worn more than .010".

Inspect the two grooved guide wheels on either side of the tension wheel (items 34 in section 6.1 of this manual). They should be 4" (101.6 mm) in diameter (bottom of groove). They should be replaced if they are worn more than .010".

NOTE: If the tension wheels or guide wheels mentioned above are worn more than .010" then the tension reading will be less than the actual line tension. The amount of error is relative to the amount of wear.

Grease all the wheels and bearings that are fitted with a flush mount grease fitting (see following diagram). Use a water-proof, marine grade grease. An inverted grease nozzle (p/n AM5KP130) is supplied with each head. This nozzle will fit any standard grease gun.


GREASE HERE
GREASE HERE
GREASE HERE
GREASE HERE
GREASE HERE
GREASE HERE
GREASE HERE

4.4 ASSEMBLY / DISASSEMBLY PROCEDURES

4.4.1 MEASURING WHEEL, SHAFT, AND BEARING REMOVAL

Either measuring wheel can be removed from the measuring head. First shift the red release handle to move the wheel away from the frame. Next remove the encoder with its adapter.

On the later model heads, the wheels are keyed onto the shaft and can be removed simply by removing the screw holding the wheel to the shaft.

On earlier model heads, the wheels are pressed on to the shaft. The lower snap ring between the wheel and the bearing must first be removed. Pull the wheel and shaft from the mount. Reassemble in the opposite order. The bearing should also be replaced at this time.

4.4.2 ELECTRONIC LOAD PIN REMOVAL

The electronic load pin is held in place by one retaining ring on the outer end of its shaft. Remove the retaining ring. The load pin can then be removed from the mounting frame.

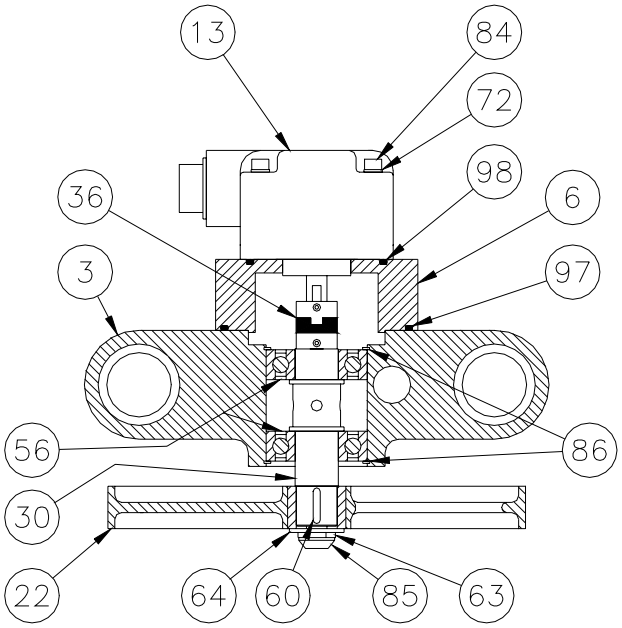
4.4.3 BACKUP DEPTH MAGNETIC PICKUP REMOVAL AND INSTALLATION

The backup depth magnetic pickup is mounted to the encoder adapter. It is held in place by four screws. Remove the screws and the pickup can then be removed. The pickup must be properly oriented to work correctly. The slot should be oriented to the top. The top side is the encoder side. Ensure that an o-ring is inserted between the plastic housing and the mount. An additional o-ring is used between the connector and the housing to keep moisture out.

If the backup display is counting backward (i.e. counting negative when going downhole), simply rotate the pickup 180 degrees to change the direction.

4.4.4 ENCODER COUPLING INSTALLATION

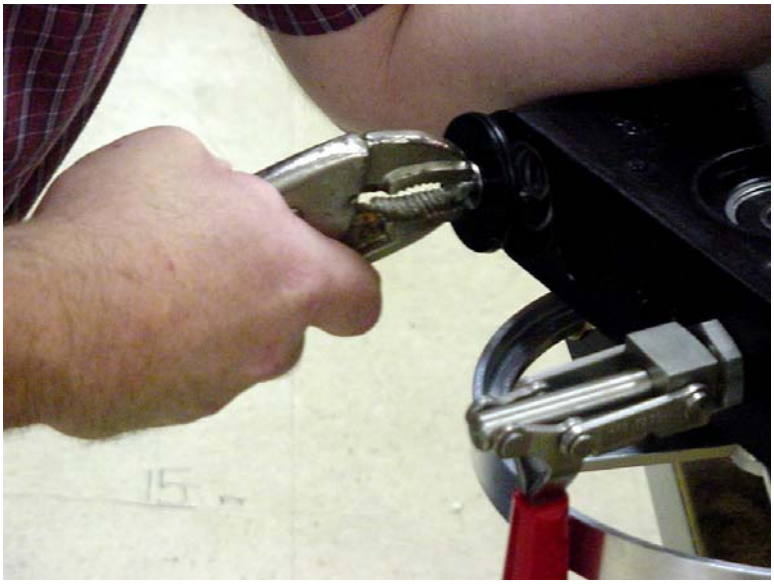
To install the encoder coupling, first remove the plug in the encoder adapter. Install one of the metal parts of the three piece coupling (item 36) to the wheel shaft and tighten it using a hex wrench. Next, install the center plastic piece of the coupling onto the wheel shaft coupling. Place the other metal coupling on the encoder shaft and set the encoder on the mount. Snug up the encoder coupling then remove the encoder and tighten the coupling.
Reinstall the encoder with o-rings (item 98) and tighten it to the encoder mount (item 6). Next tighten the plug.



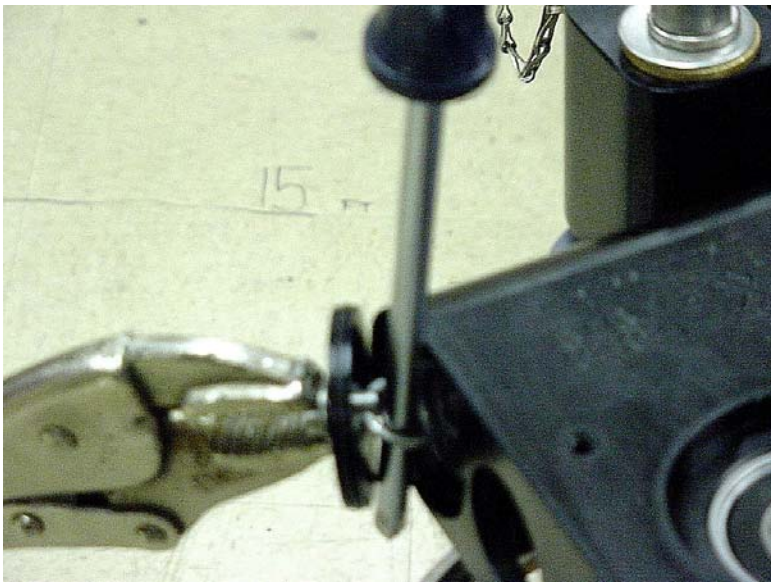
4.4.5 ENCODER MOUNT REMOVAL

Follow these steps to remove the encoder mounts.

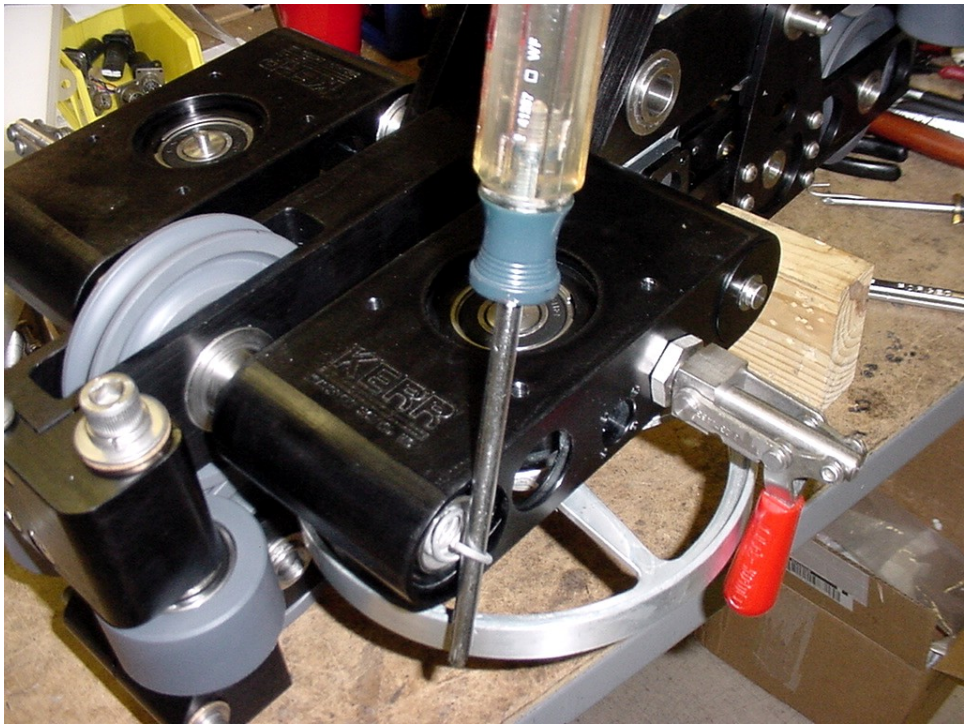
1. Using a pair of vice grips, grab the end of the pin and pull on it (see photo).



2. Use a screw driver to capture the end of the spring (see photo).



3. The end cap and the pin can now be removed (see Photo)



4 Use a hook to pull the spring out far enough to remove the screwdriver (Careful not to bend the spring).

5. Remove the floating encoder assembly.

6. Repeat for the other side.

7. Remove anti-rotation screw (if equipped).

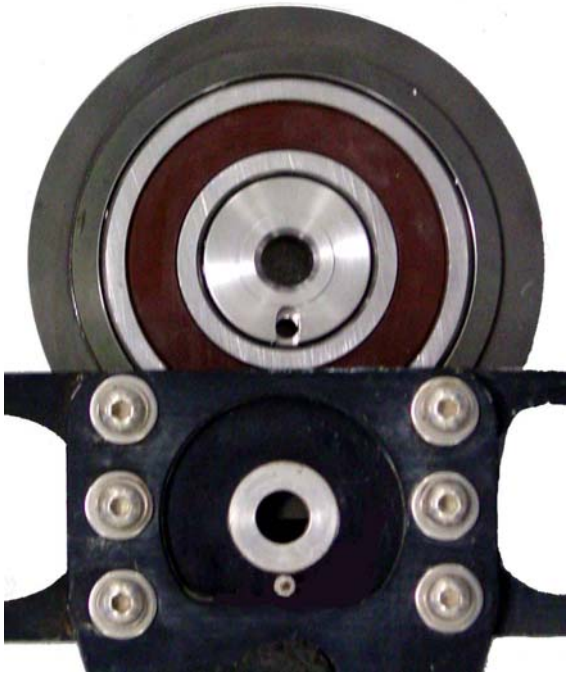
8. Remove snap ring and pull out sliding shaft.

9. Remove the wheel assembly.

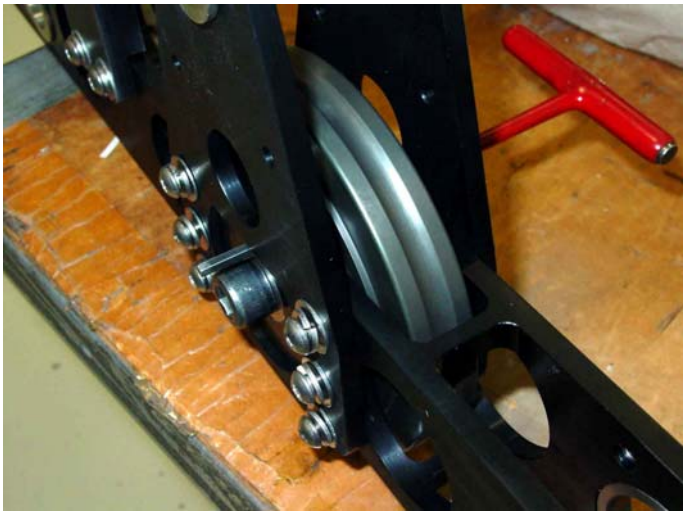
10. Re-assemble in reverse order.

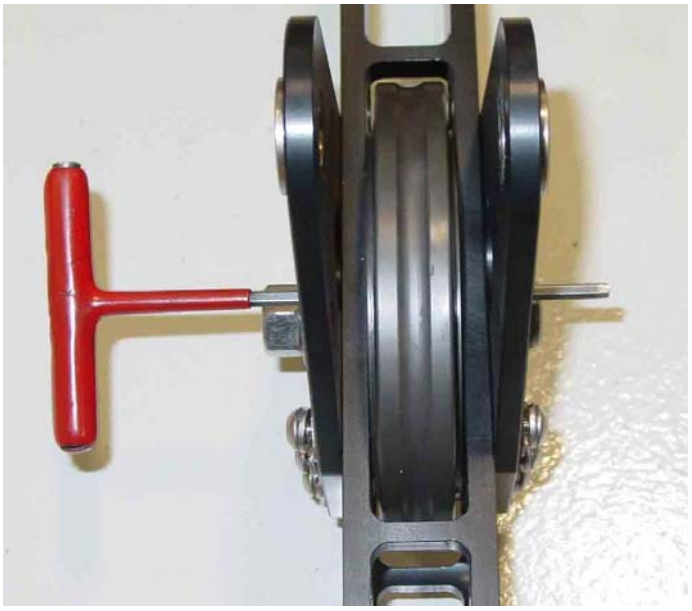
4.4.6 INSTALLING THE LOAD AXLE WHEEL

1. Insert the tension wheel into the frame. Make sure the slotted hole in the tension wheel bushing is on the same side as the roll pin hole in the frame and the grease hole is on the opposite side.

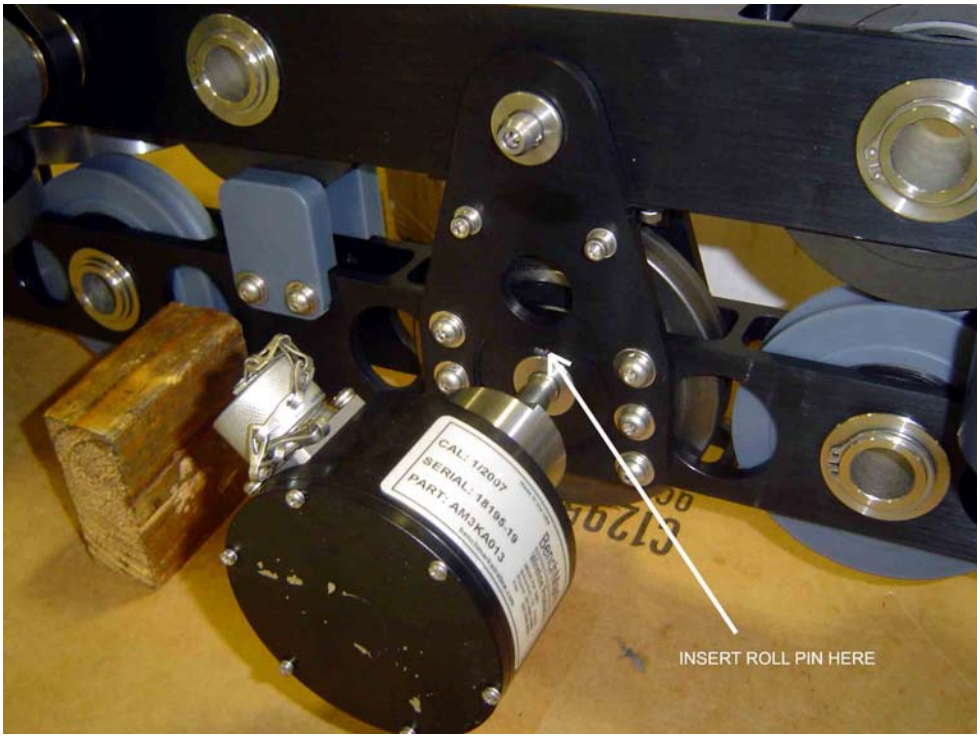


2. Use a bolt in place of the load pin to hold it in place. Install an allen wrench or other long tool to align the hole in the bearing with the slotted hole in the frame.

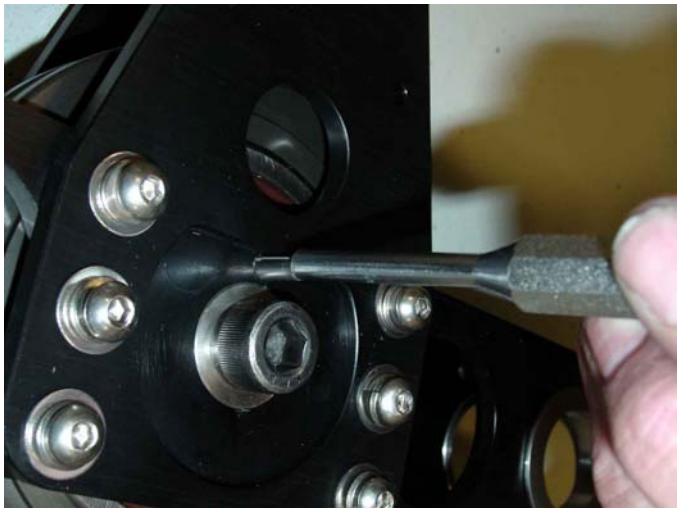




3. Insert a 3/16” x 1/2” long roll pin into the hole. Do not use a longer roll pin as it will put the wheel into a bind.



4. Drive the roll pin flush. Make sure that the wheel can freely slide up and down.



5. Remove the bolt and install the load pin.

AFTER ASSEMBLY IS COMPLETE THE HEAD SHOULD BE CONFIGURED AS SHOWN BELOW

BenchMark
Wireline Products
INSERT PUNCH TO REMOVE ROLL PIN
ENSURE GREASE HOLE IS ON SIDE OPPOSITE OF LOAD PIN AMPLIFIER

5.0 RECOMMENDED SPARE PARTS

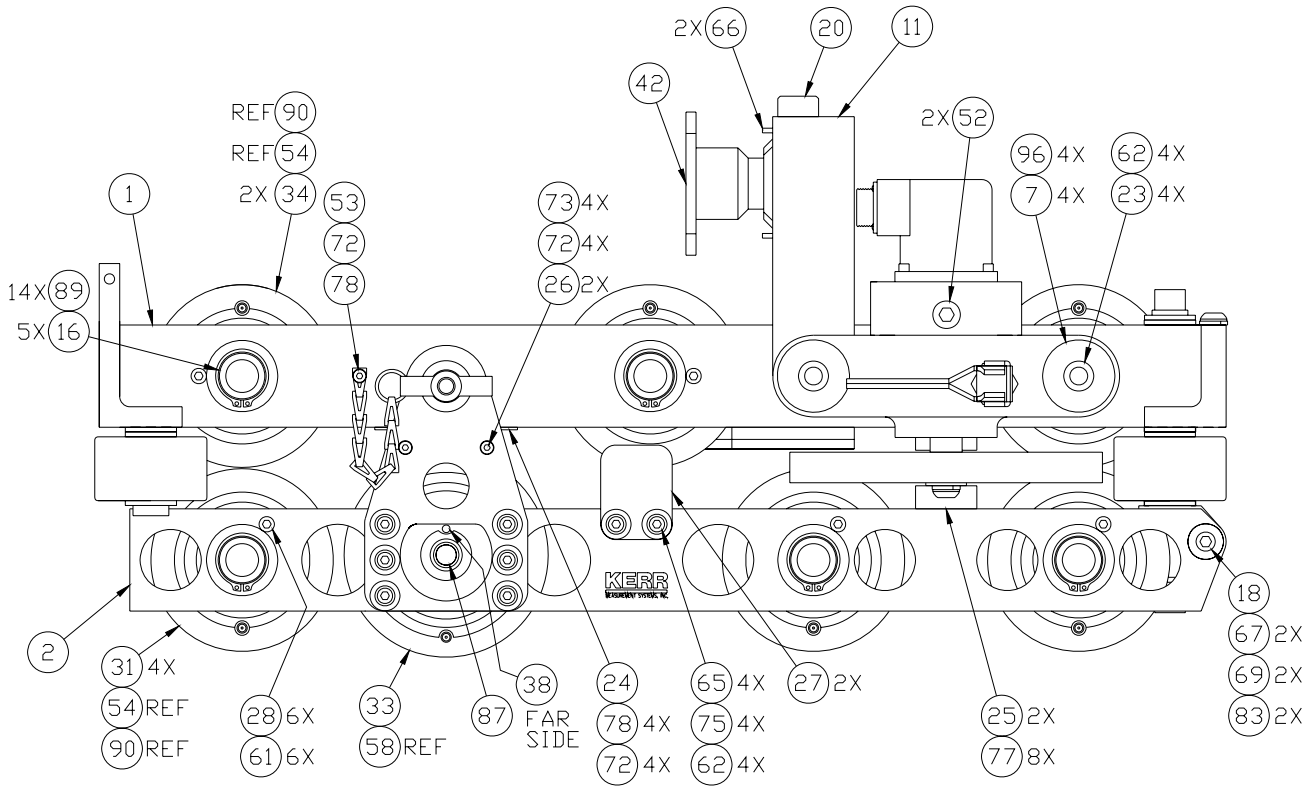
It is recommended that the following list of parts be kept on hand for remote locations.

ITEM	KERR P/N	DESCRIPTION	QTY	REF
10	AM5KA087	ASSY LOAD AXLE 2MV/V EEx nA	1	
12	AM5KA066	ASSY MAG MARK DETECTOR EEx Na	1	
13	AM5KA068	ENCODER HD2.5D-0-SS-1200- EEx nA	1	ORGINAL WIRING (BLACK)
13	AM5KA080	ENCODER HD2.5D-0-SS-1200- EEx nA	1	NEW WIRING (BLUE)
14	AM5KA058	ASSY BACKUP MAGNETIC EEx Na	1	
22	AM5KM001	WHEEL MEASURING 2FT 5 SPOKE	2	
31	AM5KA137	ASSY WHEEL GUIDE PLAS 35MM BRG	4	
33	AM5KA063	ASSY WHEEL TENSN SHALLOW GROOVE	1	
33	AM5KA073	ASSY WHEEL TENSN DEEP GROOVE	1	OPTION (HI TENSION)
34	AM5KA164	ASSY WHEEL TENSN FIXD 35MM BRG	2	
35	AM5KA065	ASSY ROLLER SPOOLNG 2.75" PLAS	4	
36	AM5KM073	COUPLING MOD ENCDR 0.250/0.375	2	
51	AMS1P009	RETAINING PIN (T HANDLE)	1	
54	AM5KM157	BEARING BALL 35MM ID MOD	6	
55	AM5KP088	BEARING LINEAR 30MMID X 40MMOD	8	
56	C276P002	BEARING BALL 20MM FAFNIR 204PP	4	
58	AM5KM134	BEARING BALL 40MM ID MOD	1	
59	AM5KP001	CLAMP TOGGLE PUSH/PULL SST	1	
101	AM5KP130	NOZZLE GREASE FITTNG FLUSH	1	

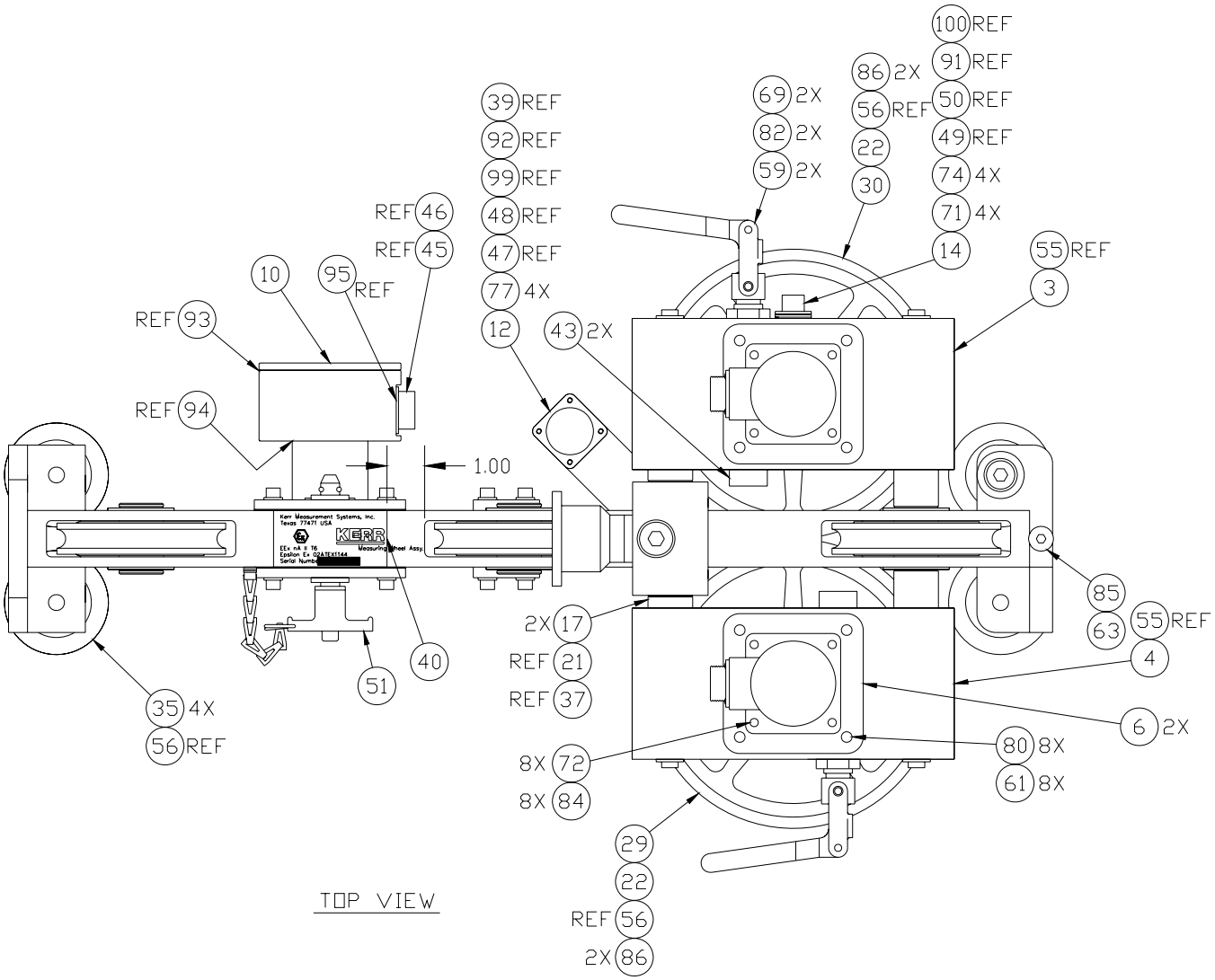
6.0 DRAWINGS AND PARTS LISTS

6.1 MEASURE HEAD ASSEMBLY

SIDE VIEW



TOP VIEW


100 REF
91 REF
86 2X
50 REF
56 REF
49 REF
22
74 4X
30
71 4X
14
55 REF
3
69 2X
82 2X
59 2X
39 REF
92 REF
99 REF
48 REF
47 REF
77 4X
12
43 2X
REF 46
REF 45
10
95 REF
REF 93
REF 94
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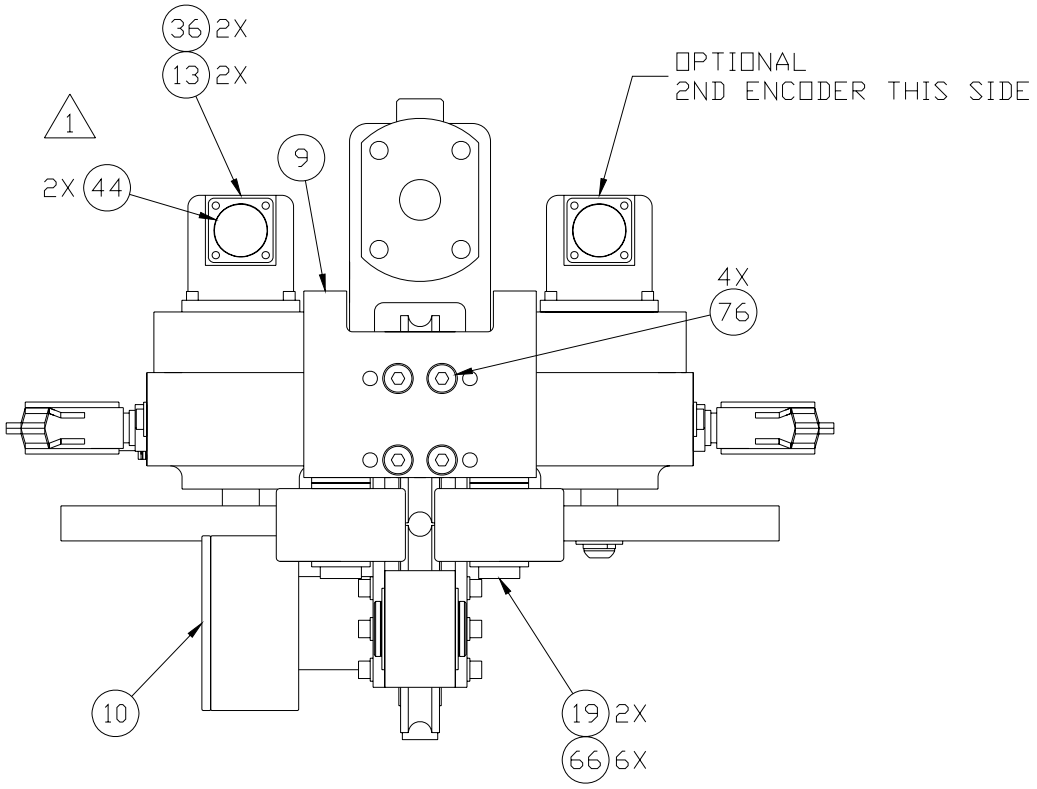
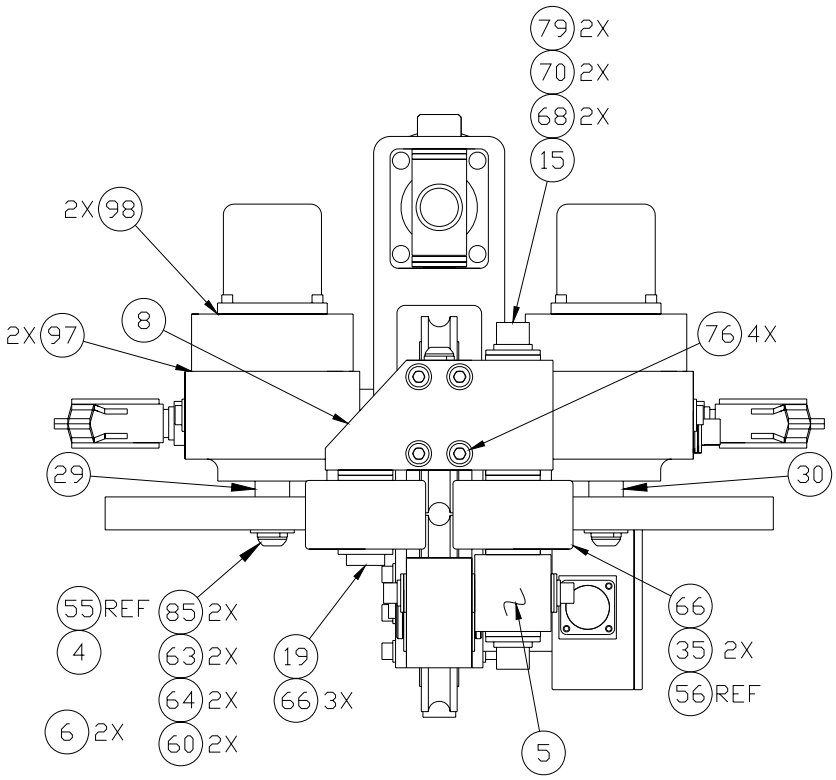
4
6 2X
80 8X
61 8X
2X 17
REF 21
REF 37
8X 72
8X 84
35 4X
56 REF
51
40
29
22
REF 56
2X 86
TOP VIEW

FRONT VIEW


36 2X
13 2X
1
2X 44
9
OPTIONAL
2ND ENCODER THIS SIDE
4X
76
10
19 2X
66 6X

REAR VIEW


79 2X
70 2X
68 2X
15
2X 98
8
2X 97
76 4X
29
30
55 REF
4
6 2X
85 2X
63 2X
64 2X
60 2X
19
66 3X
5
66
35 2X
56 REF

BenchMark Wireline Products
36220 FM 1093
P. O. BOX 850
Simonton,Texas 77476
Phone: 281.346.4300
Fax: 281.346.4301
benchmarkwireline.com

PARTS LIST

ITEM	KERR P/N	DESCRIPTION	QTY	REF
1	AM5KA131	ASSY FRAME BACKBONE UPPER 5WHL	1	
2	AM5KA232	ASSY FRAME BKBN LWR 5WHL GII	1	
3	AM5KA052-1	ASSY MOUNT FLTNG ENCDR WHL W/	1	OPTION
4	AM5KA052-2	ASSY MOUNT FLTNG ENCDR WHL W/0	1	
5	AM5KA053	ASSY BLOCK PIVOT HORIZ/VERT	1	
6	AM5KM057	ADAPTER ENCODER H37C/H25D	2	OPTION
6	AM5KM058	COVER ENCODER ADAPTER	1	OPTION
7	AM5KM020	ENDCAP FLOATING ENCODER MOUNT	4	
8	AM5KA057	ASSY MOUNT SPOOLNG ROLLR FRNT	1	
9	AM5KM026	MOUNT SPOOLING ROLLER REAR	1	
10	AM5KA087	ASSY LOAD AXLE 2MV/V EEx nA	1	
11	AM5KA040	ASSY MOUNT CENTER YOKE 5 WHEEL	1	OPTION
12	AM5KA066	ASSY MAG MARK DETECTOR EEx Na	1	
13	AM5KA068	ENCODER HD2.5D-0-SS-1200- EEx nA	1	ORGINAL WIRING (BLACK)
13	AM5KA080	ENCODER HD2.5D-0-SS-1200- EEx nA	1	NEW WIRING (BLUE)
14	AM5KA058	ASSY BACKUP MAGNETIC EEx Na	1	
15	AM5KM024	SHAFT PIVOT VERTICAL 20MM SST	1	
16	AM5KM011	SHAFT TENSION ROLLER 30MM SST	5	
17	AM5KA059	ASSY SHAFT ENCODER SLIDE 30MM	2	
18	AM5KM023	SHAFT PIVOT HORIZONTAL 1/2 SST	1	
19	AM5KM013	SHAFT SPOOLING ROLLER 20MM	3	
20	AM5KP023	BOLT SHOULDER 3/4 X 3 SST	1	
21	AM5KP002	SPRING EXT 4" OAL 47/64 DIA SST	4	
22	AM5KM001	WHEEL MEASURING 2FT 5 SPOKE	2	
23	AM5KM141	ANCHOR SPRING 1/2" FLOATING	4	
24	AM5KM034	PLATE WEAR 1/16 X 1.5 X 3.5	1	
25	AM5KM049	BLOCK WEAR 1.50 X 1.50 X 0.56 STL	2	LARGE LINES
25	AM5KM074	BLOCK WEAR UPPER TOOL STL CH	1	SMALL LINES ONLY
26	AM3KM134	BLOCK WEAR 0.75 X 2.50 TOOLSTL	2	
27	AM5KM159	BLOCK GUIDE TENSION WHEEL PLAS	2	
28	AM5KM084	SCREW ANTI-ROTATION TENS WHEEL	6	
29	AM5KM010	SHAFT WHEEL CANTILEVERED 5 WHL	1	
30	AM5KM060	SHAFT WHEEL CANTLVRD MAG 5 WHL	1	OPTION
31	AM5KA137	ASSY WHEEL GUIDE PLAS 35MM BRG	4	
33	AM5KA063	ASSY WHEEL TENSN SHALLOW GRV	1	OPTION
33	AM5KA073	ASSY WHEEL TENSN DEEP GRV	1	OPTION (HI TENSION)
34	AM5KA164	ASSY WHEEL TENSN FIXD 35MM BRG	2	
35	AM5KA065	ASSY ROLLER SPOOLNG 2.75" PLAS	4	
36	AM5KM073	COUPLING MOD ENCDR 0.250/0.375	2	OPTION
37	AM5KP124	PIN COILED SPRING 1/4 X 1-1/8	2	ENCODER SLIDE
38	AM5KP125	PIN COILED SPRING 3/16 X 1/2	1	TENSION WHEEL PIN
42	AM5KM138	YOKE PIVOT CENTER MOUNT SST	1	
43	AM5KM040	PUSHROD TOGGLE CLAMP PLASTIC	2	

51	AMS1P009	RETAINING PIN (T HANDLE)	1	
52	AMS1P072	PLUG 3/8 NPT SS	2	
53	AM5KP075	CHAIN SASH #35 SST	6	
54	AM5KM157	BEARING BALL 35MM ID MOD	6	
55	AM5KP088	BEARING LINEAR 30MMID X 40MMOD	8	
56	C276P002	BEARING BALL 20MM FAFNIR 204PP	4	
58	AM5KM134	BEARING BALL 40MM ID MOD	1	
59	AM5KP001	CLAMP TOGGLE PUSH/PULL SST	2	
60	AM5KM055	KEY 1/8 X 1/8 X 0.625L SST	2	
61	AM5KP144	WASHER 1/4 LOCK SS HIGH COLLAR	4	
62	ACMU2P31	WASHER 1/4 FLAT SS	8	
63	AMS1P058	WASHER 3/8 LOCK SS	3	
64	C276P513	WASHER 3/8 FLAT SST	2	
65	C276P036	WASHER 1/4 LOCK SS	4	
66	AM5KP011	WASHER 20MM FLAT SST	12	
67	C276P039	WASHER 5/16 FLAT SST	2	
68	AMS1P066	WASHER 1/2 LOCK SS	2	
69	AMS1P047	WASHER 5/16 LOCK SS	4	
70	C276P037	WASHER 1/2 FLAT SST	2	
71	C276P046	WASHER #6 LOCK SS	4	
72	C276P035	WASHER #10 LOCK SS	7	
73	AMS1P052	SCREW 10-24 X 5/8 SOC HD SST	4	
74	C276P331	SCREW 6-32 X 1/2 PHIL PAN SST	4	
75	AM5KP117	SCREW 1/4-20 X 5/8 BTN HD SST	4	
76	AM5KP038	SCREW 5/16-18 X 7/8 FH SOC SS	8	
77	AM5KP039	SCREW 10-24 X 7/8 FH SOC SST	2	
78	AM5KP040	SCREW 10-24 X 3/8 SOC HD SST	5	
79	AM5KP042	SCREW 1/2-13 X 3/4 SOC HD SST	2	
80	AMS1P048	SCREW 1/4-20 X 3/4 SOC HD SST	4	OPTION W/COVER
80	C276P031	SCREW 1/4-20 X 1-1/4 SOC HD SS	8	
82	AM5KP037	SCREW 5/16-18 X 4-1/2 SOC HD	2	
83	AM3KP028	SCREW 5/16-18 X 1/2 SHCS SST	2	
84	AMS1P052	SCREW 10-24 X 5/8 SOC HD SST	8	OPTION
84	AMS1P053	SCREW 10-24 X 2 SHCS SST	8	OPTION W/HD ENCDR
85	AM5KP043	SCREW 3/8-16 X 1/2 BUTTON HD	3	
86	AMS1P006	RING RETNG INT UR187S	4	
87	AM5KP033	RING RETNG EXT 0.500 SHAFT SST	1	
89	AM3KP018	RING RETNG EXT 1.188 SHAFT SST	4	
90	AM5KP168	RING RETNG INT 2.875 LT DUTY	12	
91	C276P041	O-RING 2-017 BUNA N	1	BACKUP HSG
92	AM5KP072	O-RING 2-046 BUNA N MMD COVER	1	
93	C276P040	O-RING 2-235 BUNA N L/P LID	1	
94	AMS8P066	O-RING 2-136 BUNA N L/P HSG	1	
95	AM5KP118	O-RING 2-023 BUNA N L/P CONN	1	
96	AM5KP020	O-RING 2-030 BUNA N ENDCAP	4	
97	AMS1P014	O-RING 2-152 BUNA N ENC ADPTR	2	
98	AM5KP071	O-RING 2-141 BUNA N H25 ENCDR	2	

99	AM5KP119	O-RING 2-026 BUNA N MMD CONN	1	
100	C276P042	O-RING 2-016 BUNA N	1	BACKUP CONN
101	AM5KP130	NOZZLE GREASE FITTNG FLUSH	1	NOT SHOWN

6.2 MAGNETIC MARK DETECTOR SPECIFICATION

1. General

This specification describes the latest Kerr Measurement Systems magnetic mark detector. It replaces the original AMS100 detector, p/n AMS1A003. The performance characteristics emulate the original unit.

2. Mechanical

The mark detector will work in both the original housing p/n AMS1M022 and the AM5K versions using p/n AM5KM029. The pc board is potted to prevent damage from shock, vibration, or humidity.

3. Power

Input power is 9 - 30vdc at 100ma max.

4. Outputs

Digital line driver out for strong & strong\ and also weak & weak\ where a weak mark is 4 gauss or less and a strong mark is greater than 4.1 gauss measured 0.10 inch from cable surface. The signals are a +5vdc digital pulse. A digitized 0-5vdc representation of the analog signal is provided.

5. Performance

a) Operating temperature -40 to +120 f. compensated and stable. Storage temperature -60 to +180 f.

b) Magnetic mark detection at cable line speeds of 1 to 1000 feet per minute.

c) Auto cal feature removes offset of the electronics and any constant magnetic field less than 1 gauss every 100ms. If in a greater field, it will auto calibrate every 11 seconds.

d) Detection of apparent zero gauss (at high/low crossing) is within 0.1 inch and repeatable so as any error is not accumulative.

e) Will survive a gauss level exposure of 60 gauss.

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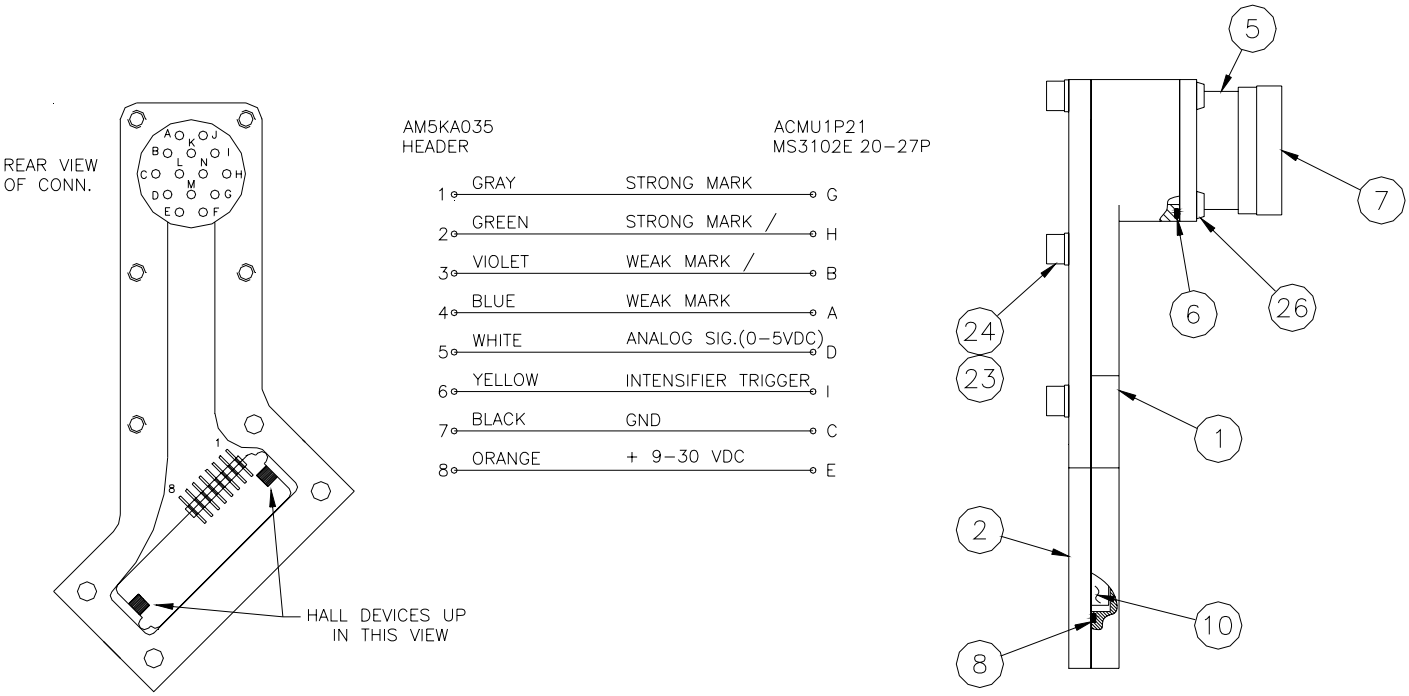
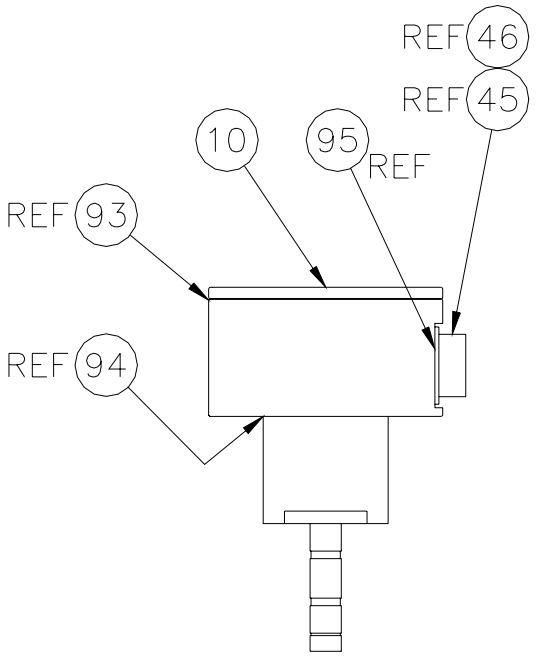


AM5KA066 ASSY MMD EEx Na

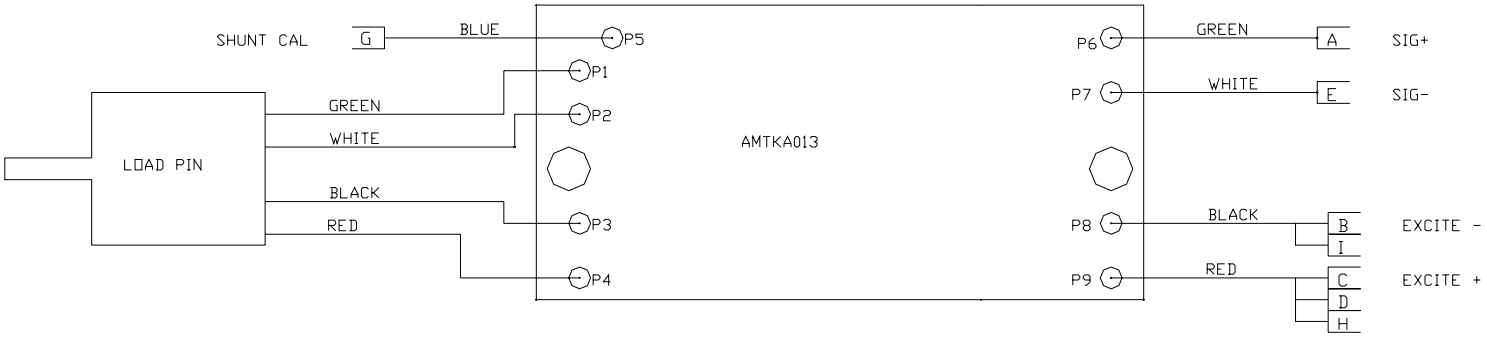
1	AM5KM029	ENCLSR MAGNETIC MARK DETECTOR	1	EA
2	AM5KM035	COVER MAGNETIC MARK DETECTOR	1	EA
5	ACMU1P21	CONN MS3102E-20-27P 14 PIN RECEPT	1	EA
6	AM5KP119	O-RING 2-026 BUNA N MMD CONN 1-1/4 X 1-3/8 X 1/16	1	EA
7	ACMU1P22	DUST CAP MS25D43-20DA	1	EA
8	AM5KP072	O-RING 2-046 BUNA N MMD COVER 4.239ID X 4.3790D X 0.070	1	EA
10	AM5KA035	PCB MMD POTTED, AM5K OR AMS100	1	EA
23	C276P035	WASHER #10 LOCK SS	5	EA
24	AMS8P029	SCREW 10-24 X 1/2 SOC HD SST	5	EA
26	AMS1P040	SCREW 6-32 X 3/8 PAN HD SST	4	EA

6.3 LOAD PIN

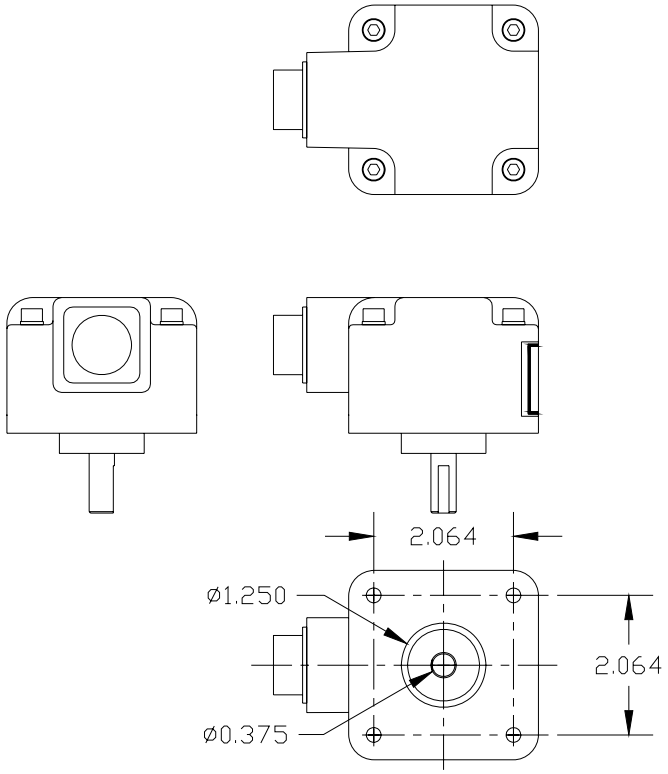


AM5KA087 ASSY LOAD AXLE 3MV/V

45	AM5KP068	CONN 10-107218-1P BENDIX QWL COURSE THD 10 PIN	1	EA
46	AM5KP067	DUST CAP CW49N16C CANNON CWL COURSE THREAD	1	EA
93	C276P040	O-RING 2-235 BUNA N L/P LID 3-1/8 X 3-3/8 X 1/8	1	EA
94	AMS8P066	O-RING 2-136 BUNA N L/P HSG 1.98ID X 2.19OD X 0.103W	1	EA
95	AM5KP118	O-RING 2-023 BUNA N L/P CONN 1-1/16 X 1-3/16 X 1/16	1	EA



6.4 ENCODER AM5KA068 (Original Wiring – Black Cover)



13	AM5KAP161	ENCODER H25D-SS-1200-ABC-4469 EEx nA	1	EA
36	AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	1	EA
44	AMS1P071	DUST CAP MS25043-16DA	1	EA

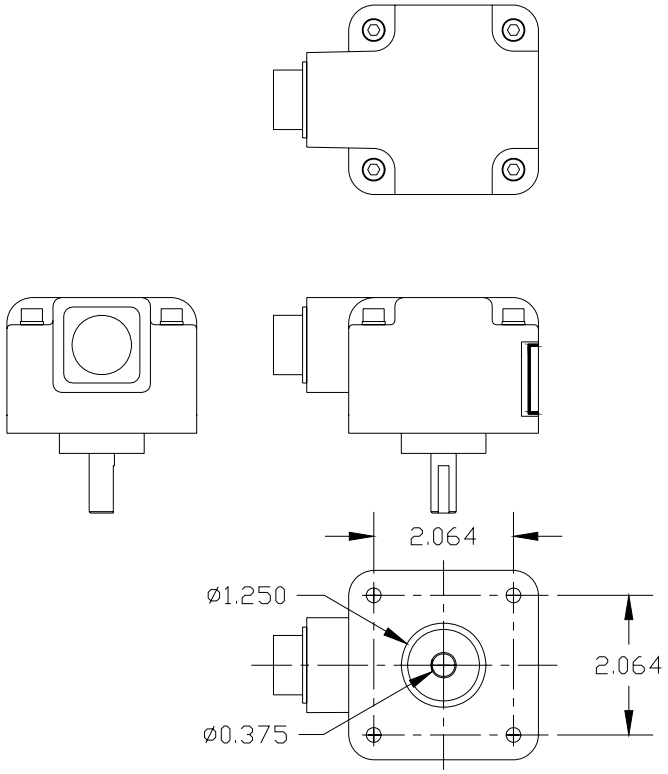
Note: This encoder requires a AMS4A130 cable (BLACK jacket)

Specifications

1200 Pulses per revolution
5 – 15 vdc power
Differential Quadrature output (A – A not, B – B not)

E - A
C - A\
G - B
D - B\
A - + 5v
B - Gnd
F - Case

6.5 ENCODER AM5KA080 (New Wiring – Blue Cover)



13	AM5KP192	ENCODER H25D-SS-1200-ABC-4469 EEx nA	1	EA
36	AM5KM073	COUPLING MOD ENCDR 0.250/0.375 BORE	1	EA
44	AMS1P071	DUST CAP MS25043-16DA	1	EA

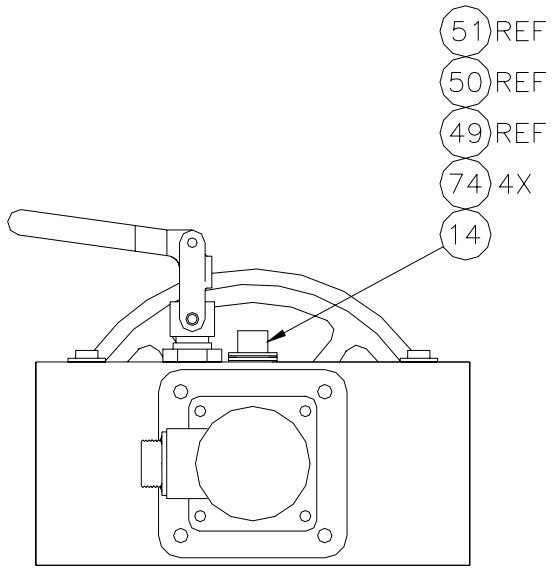
Note: This encoder requires a AMS4A140 cable (BLUE jacket)

Specifications

1200 Pulses per revolution
5 – 15 vdc power
Differential Quadrature output (A – A not, B – B not)

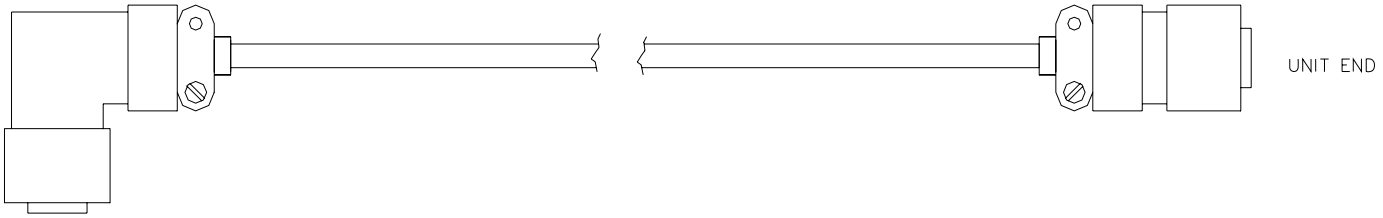
A - A
C - A\
B - B
E - B\
D - + 5v
F - Gnd
G - Case

6.6 BACKUP ODOMETER CABLE AND WIRING



14	AM5KA058	ASSY ENCODER BACKUP MAGNETIC	1	EA
49	AM5KP027	CONN KPT02E10-6P RECEPTACLE MS3112	1	EA
50	AM5KP034	DUST CAP KPT8110C CANNON SHELL SIZE 10	1	EA
51	C276P041	O-RING 2-017	2	EA
74	AMS1P040	SCREW 6-32 X 3/8 PAN HD SST	4	EA

AM5KA024-20 BACKUP ODOMETER CABLE



1	AMS7P062	CABLE 24/2P STNDED TC PE/PVC AL/MY SHLD W/DW NEC CMUL2919	20	FT
2	AM5KP057	CONN KPT06F10-6P STR PLUG	1	EA
3	AM5KP058	CONN KPT08F10-6S RT ANGLE PLUG	1	EA
4	AM5KP059	DUST CAP KPT8010C CANNON	2	EA
5	AM5KA034	BUSHING #9779-513-4 AMPHENOL	2	EA

7.0 CERTIFICATION DOCUMENTATION

7.1 MEASURING HEAD ATEX Conformity Certificate

Epsilon Compliance

ATEX Conformity Variation Certificate

Epsilon Certificate Number:

Epsilon 02ATEX1144/1

This certificate is issued for the following equipment:

5 Wheel Cable Measurement Device.
Inline Tension Device.

Manufactured and submitted by:

Kerr Measurement Systems, Inc.
6415 Reading Road
Rosenberg
Texas 77471
USA

The equipment shall be designed and constructed in accordance with the specification set out in the schedule herein and documents referred to therein.

This Certificate is issued subject to the conditions of Epsilon Compliance and any additional conditions as may be prescribed.

This Certificate does not imply that the equipment meets all statutory requirements in any particular industry or circumstance.

Directive/s:

ATEX Directive, 94/9/EC

Standard/s:

EN50021: 1999

Coding:

CE Ex EEx nA II T6

Project Number:

ETS0412

Issue Date:
01 November 2004

Report Number:

ETS(A)0412/B/1

On Behalf of Epsilon Compliance

S L D'Henin
Certification Manager

ASCB(E) Accrediting Certifying Bodies

This certificate may only be used in its entirety and without change

Ex

Epsilon Compliance (UK),
Drury Lane, Drury, Buckley, CH7 3DU, UK.
Telephone: +44(0)1244 541551
Fax: +44(0)1244 543888

1/2

7.2 MEASURING HEAD ATEX Conformity Certificate – Sheet 1

Epsilon Compliance

ATEX Variation Conformity Certificate Schedule

Epsilon Certificate Number:

Epsilon 04ATEX1144/1

Variation 1 Description:

The 5 wheel measuring device range is extended to include the following versions:

- 512/780PPR 0-1.5V
- 2X1200PPR MS16 0-1.5V DIFF
- 2X1200PPR MS16 2.0mV/V

An inline tension device of the following types is included in the scope of the certificate:

- 0-1.5V DIFF
- 2.0mV/V

Drawings:

Number	Rev	Date	Title
AMTKA105	A	4/03	DEVICE ASY INLINE TENSION 0-1.5V DIFF EEx nA
AMTKA106	A	4/03	DEVICE ASSY INLINE TENISION 2.0 mV/V EEx nA
AM5KA107	B	4/03	DEVICE ASSY 5 WHEEL 2 X 1200PPR MS16 2.0mV/V EEx nA
AM5KA110	B	4/03	DEVICE ASSY 5 WHEEL 2 X 1200PPR MS16 0-1.5V DIFF EEx nA
AM5KA117	A	4/03	DEVICE ASSY 5 WHEEL 512/780PPR 0-1.5V EEx nA
AM5KA121	A	4/03	DEVICE ASSY 5 WHEEL BASE MODEL EEx nA
AM5KA507	A	8/04	DEVICE ASSY 5 WHEEL 2 X 1200PPR MS16 2.0mV/V EEx nA GEN II
AM5KA510	A	8/04	DEVICE ASSY 5 WHEEL 2 X 1200PPR MS16 0-1.5V DIFF EEx nA GEN II
AM5KA517	A	8/04	DEVICE ASSY 5 WHEEL 512/780PPR 0-1.5V EEx nA GEN II
AM5KA521	A	8/04	DEVICE ASSY 5 WHEEL BASE MODEL EEx nA GEN II

Conditions of Certification:

None

Special Conditions of Certification:

None

ASCB(E) Accrediting Certifying Bodies

This certificate may only be used in its entirety and without change

Ex

Epsilon Compliance (UK),
Drury Lane, Drury, Buckley, CH7 3DU, UK.
Telephone: +44(0)1244 541551
Fax: +44(0)1244 543888

2/2

MEASURING HEAD ATEX Conformity Certificate – Sheet 2

ATEX Certificate Schedule

Epsilon Certificate Number:

Epsilon Ex 02ATEX1144

Equipment Description:

The Type 2MV EX 5 Wheel Cable Measurement Device consist of the following certified parts: Optical Encoder 1200 Pulse/Rev Ex, Magnetic Mark Detector EX and Load Axle 2MV/V EX. The device is designed to measure various cable parameters using the listed sensors.

Drawings:

Number	Rev	Date	Title
AM5KA110 2 Shts.	A	May 02	DEVICE ASSY 5 Wheel Zone 2
AM5KM620	A	May 02	LABEL 5 Wheel 2MV EX
AM5KA527	A	April 06	DEVICE ASSY 5 WHL
AM5KA529	A	April 06	DEVICE ASSY 5 WHL
AM5KA521	A1	April 06	DEVICE ASSY 5 WHL

Conditions of Certification:

None

Special Conditions of Certification:

None

Note:

Certificate re issued in June 2006 to include additional drawings in the schedule list. These drawings have no affect on the original certification of the equipment.

Epsilon Certification Service Limited
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E-mail: certification@epsilon-ltd.com

Sheet 2 of 2

7.3 ENCODER ATEX Conformity Certificate

epsilon

ATEX Conformity Certificate

Epsilon Certificate Number:

Epsilon Ex 02ATEX1141

This certificate is issued for the electrical equipment:

Optical Encoder 1200 Pulse/Rev Ex

Manufactured and submitted by:

Kerr Measurement Systems, Inc.
6415 Reading Road
Rosenberg
Texas 77471
USA

The equipment shall be designed and constructed in accordance with the specification set out in the schedule herein and documents referred to therein.

This Certificate is issued subject to the conditions of Epsilon Certification Service and any additional conditions as may be prescribed.

This Certificate does not imply that the equipment meets all statutory requirements in any particular industry or circumstance.

Directive/s:
ATEX Directive - EU 94/9/EC

Standard/s
EN 50021:1999

Coding:

CE Ex II 3 G EEx nA II T6

Epsilon Project Number:
ETS0412

Epsilon Report Number:
ETS(A)0412/E/1

Issue Date: 22 May 2002

On Behalf of Epsilon Certification Service

S L D'Henin
Certification Manager

This certificate may only be used in its entirety and without change

National Association of Professional Inspectors & Testers

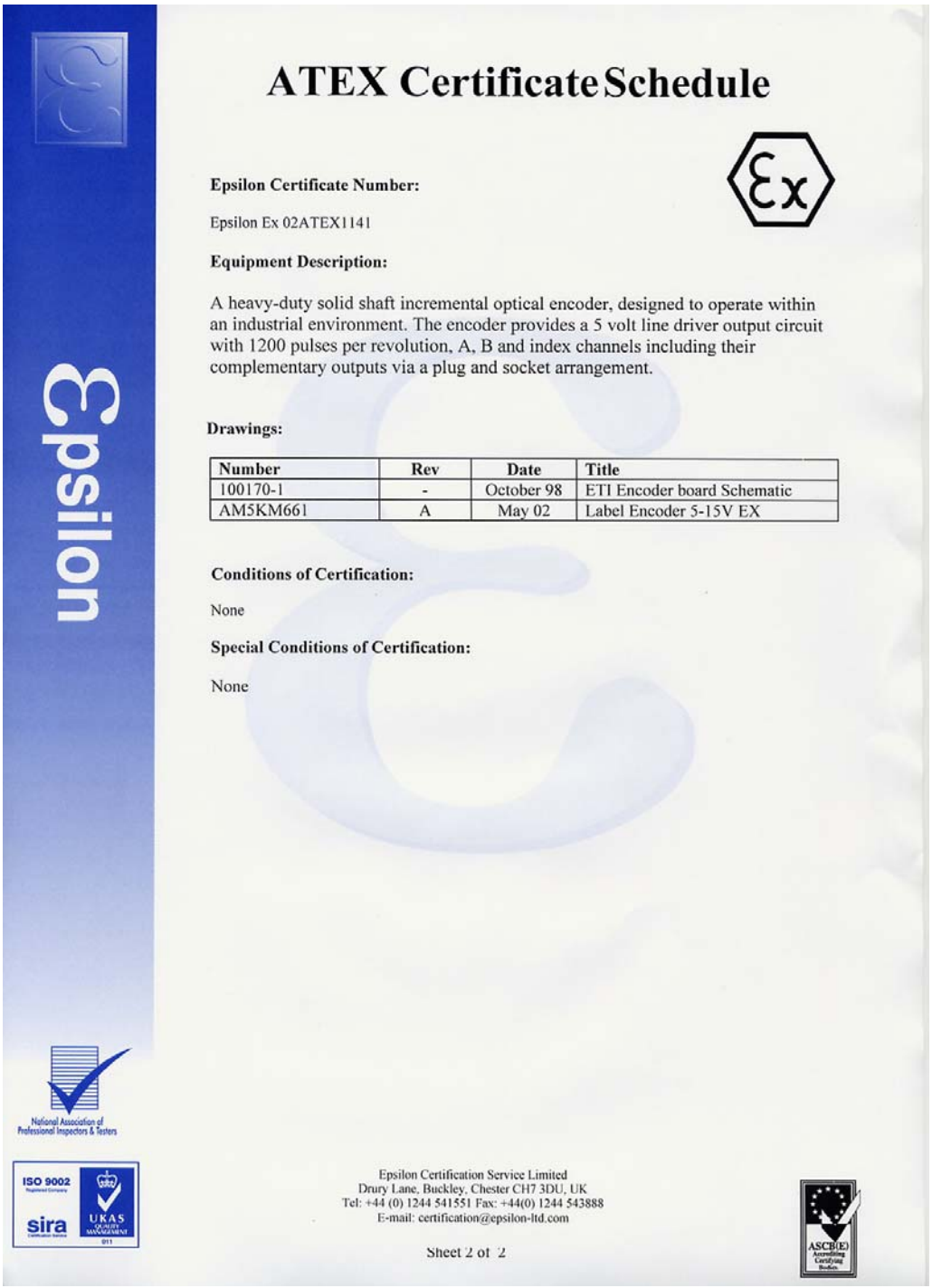
ISO 9002 sira UKAS QUALITY MANAGEMENT

Epsilon Technical Services Limited is certified against the requirements of ISO 9002 for assessment of products against EU Standards and Directives and is accredited for test and inspection by N.A.P.I.T. Epsilon is accredited as a Certification Body by the ASCB(E) (Accreditation Service for Certifying Bodies (Europe)).

ASCB(E) Accrediting Certifying Bodies

Sheet 1 of 2

7.4 ENCODER ATEX Conformity Schedule



ATEX Certificate Schedule

Epsilon Certificate Number:

Epsilon Ex 02ATEX1141

Equipment Description:

A heavy-duty solid shaft incremental optical encoder, designed to operate within an industrial environment. The encoder provides a 5 volt line driver output circuit with 1200 pulses per revolution, A, B and index channels including their complementary outputs via a plug and socket arrangement.

Drawings:

Number	Rev	Date	Title
100170-1	-	October 98	ETI Encoder board Schematic
AM5KM661	A	May 02	Label Encoder 5-15V EX

Conditions of Certification:

None

Special Conditions of Certification:

None

Epsilon Certification Service Limited
Drury Lane, Buckley, Chester CH7 3DU, UK
Tel: +44 (0) 1244 541551 Fax: +44(0) 1244 543888
E-mail: certification@epsilon-ltd.com

Sheet 2 of 2

7.5 LOAD PIN ATEX Conformity Certificate

ATEX Conformity Certificate

Epsilon Certificate Number:

Epsilon Ex 02ATEX1142

This certificate is issued for the electrical equipment:

Load Axle 2MV/V EX

Manufactured and submitted by:

Kerr Measurement Systems, Inc.
6415 Reading Road
Rosenberg
Texas 77471
USA

The equipment shall be designed and constructed in accordance with the specification set out in the schedule herein and documents referred to therein.

This Certificate is issued subject to the conditions of Epsilon Certification Service and any additional conditions as may be prescribed.

This Certificate does not imply that the equipment meets all statutory requirements in any particular industry or circumstance.

Directive/s:
ATEX Directive - EU 94/9/EC

Standard/s
EN 50021:1999

Coding:

CE Ex II 3 G EEx nA II T6

Epsilon Project Number:
ETS0412

Epsilon Report Number:
ETS(A)0412/B/1

Issue Date: 22 May 2002

On Behalf of Epsilon Certification Service

S L D'Henin
Certification Manager

This certificate may only be used in its entirety and without change

Epsilon Technical Services Limited is certified against the requirements of ISO 9002 for assessment of products against EU Standards and Directives and is accredited for test and inspection by N.A.P.I.T. Epsilon is accredited as a Certification Body by the ASCB(E) (Accreditation Service for Certifying Bodies (Europe)).

Sheet 1 of 2

7.6 LOAD PIN ATEX Conformity Schedule

ATEX Certificate Schedule

Epsilon Certificate Number:

Epsilon Ex 02ATEX1142

Equipment Description:

The load axle is a device used to translate force or weight into an electrical signal. The internal strain gauges change their electrical resistance in proportion to the strain placed on them. The resulting small signal is amplified and output as a voltage. This unit is constructed from high strength alloys.

Drawings:

Number	Rev	Date	Title
AWTKA013	A	October 01	Low voltage Load Cell Amp
AM5KM610	A	May 02	Lid Load Pin Housing MV/V EX
AMTKA014	A	August 01	0-1.5V Differential Tension

Conditions of Certification:

None

Special Conditions of Certification:

None

Epsilon Certification Service Limited
Drury Lane, Buckley, Chester CH7 3DU, UK
Tel: +44 (0) 1244 541551 Fax: +44(0) 1244 543888
E-mail: certification@epsilon-ltd.com

7.7 MARK DETECTOR ATEX Conformity Certificate

ATEX Conformity Certificate

Epsilon Certificate Number:

Epsilon Ex 02ATEX1143

This certificate is issued for the electrical equipment:

Magnetic Mark Detector EX

Manufactured and submitted by:

Kerr Measurement Systems, Inc.
6415 Reading Road
Rosenberg
Texas 77471
USA

The equipment shall be designed and constructed in accordance with the specification set out in the schedule herein and documents referred to therein.

This Certificate is issued subject to the conditions of Epsilon Certification Service and any additional conditions as may be prescribed.

This Certificate does not imply that the equipment meets all statutory requirements in any particular industry or circumstance.

Directive/s:
ATEX Directive - EU 94/9/EC

Standard/s
EN 50021:1999

Coding:

CE Ex II 3 G EEx nA II T6

Epsilon Project Number:
ETS0412

Epsilon Report Number:
ETS(A)0412/C/1

Issue Date: 22 May 2002

On Behalf of Epsilon Certification Service

S L D'Henin
Certification Manager

This certificate may only be used in its entirety and without change

Epsilon Technical Services Limited is certified against the requirements of ISO 9002 for assessment of products against EU Standards and Directives and is accredited for test and inspection by N.A.P.I.T. Epsilon is accredited as a Certification Body by the ASCB(E) (Accreditation Service for Certifying Bodies (Europe)).

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7.8 MARK DETECTOR ATEX Conformity Schedule

ATEX Certificate Schedule

Epsilon Certificate Number:

Epsilon Ex 02ATEX1143

Equipment Description:

The magnetic mark detector is a device which makes use of the Hall effect, for the purpose of generating a direct current voltage in the presence of a magnetic field, in this case a 5VDC electrical pulse. This unit operates between 9-30 volts DC with differential signals via a plug and socket arrangement.

Drawings:

Number	Rev	Date	Title
98600001	F	April 01	Mark Detector
AM5KM635	A	April 02	Cover Magnetic Mark Detector EX

Conditions of Certification:

None

Special Conditions of Certification:

None

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